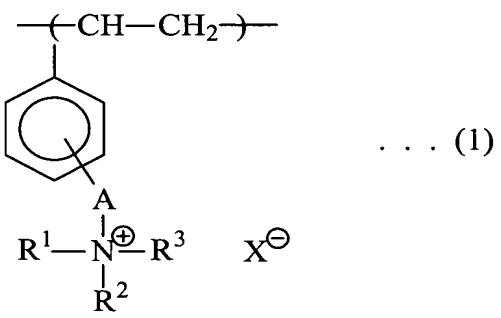


. . . (1)

a'

wherein A is a C_{3-8} alkylene group or an alkyleneoxyalkyl group having a total carbon number of from 4 to 9, each of R^1, R^2 and R^3 is a hydrogen atom, a C_{1-6} alkyl group or a hydroxyalkyl group, and X^- is an anion, and wherein any hydrogen atom bonded to the benzene ring may be substituted by an alkyl group or a halogen atom, and from 4 to 80 mass% of a thermoplastic polymer having no ion exchange groups, mixed substantially uniformly.

BASIS FOR THE AMENDMENT

Claim 1 has been amended solely to improve its language.

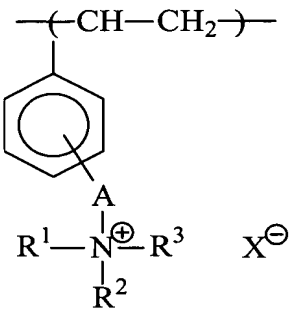
REMARKS

Favorable reconsideration of this application is requested.

Claims 1-12 are in the case.

Claims 1-4, 11 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Terada et al taken with Tomoi et al.

The invention, as defined with these claims, is directed to an anion exchange membrane comprising a resin phase which contains from 20 to 96 mass% of a polymer having repeating units represented by the following formula (1):



. . . (1)

wherein A is a C_{3-8} alkylene group or an alkyleneoxyalkyl group having a total carbon number of from 4 to 9, each of R^1, R^2 and R^3 is a hydrogen atom, a C_{1-6} alkyl group or a hydroxyalkyl group, and X is an anion, and wherein any hydrogen atom bonded to the benzene ring may be substituted by an alkyl group or a halogen atom, and from 4 to 80 mass% of a thermoplastic polymer having no ion exchange groups, mixed substantially uniformly.

Such an ion exchange membrane evinces excellent alkali resistance and heat resistance as well as having high mechanical strength. Thus, it is useful for applications in which a conventional ion exchange membrane has a problem in durability.

Terada et al discloses a porous ion exchanger having ion exchange resin particles bound by a binder polymer. Such binder polymer may be a thermoplastic polymer. However, as the polymer having an ion exchanging groups, as far as is relevant to the present invention, only polyvinylbenzyltrimethylammonium chloride is disclosed (column 5, lines 4-5). In the claimed invention, on the other hand, in the claimed polymer A is a C_{3-8} alkylene group or an alkyleneoxyalkyl group having a total carbon number of from 4 to 9. The Examiner recognizes this distinction and thus relies on Tomoi et al to assertedly cure this deficiency.

It is submitted that any presumption to this effect stands rebutted by the comparative evidence in the case. Thus, as so demonstrated by Comparative Example 3 in the case (page

20), by direct comparison with the only relevant example of Terada et al, if the anion exchange resins is prepared from chloromethylstyrene, i.e., A in formula (1) is a methylene radical, significantly inferior results are obtained.

Further, and most significantly, the claims require that the anion exchange membrane comprise the polymers to be "mixed substantially uniformly" in the membrane. This means, as so defined at page 5, lines 8-14, that when the resin phase is observed by an optical microscope, the polymer of the formula (1) and the thermoplastic polymer having no ion exchange groups can not be distinguished, and phase separated structure containing phases having a size of more than 1 μm can not be observed. This is achieved only by using the claimed process for its preparation, i.e., wherein a thermoplastic polymer having no ion exchange groups is mixed with a polymerizable component comprising a monomer of the formula (2), as defined in Claim 5, and the polymerizable monomer is then polymerized while mixed with such thermoplastic polymer. Such process is not disclosed by Terada et al.

The method of Terada et al involves only mixing of preformed polymers, as note column 5, line 17 ff. If, as in Terada at al, a heterogeneously mixed ion exchange membrane is obtained by mechanically mixing a powder of the polymer of the formula (1) and the thermoplastic polymer and forming the mixture into a membrane form by e.g. hot pressing, an inferior membrane is obtained, since deterioration of the selective permeability of ions due to an increase of the concentration of the electrolyte is thereby substantial, and if it is used for a long period of time at a high temperature or in a solution having a composition which swells the resin, deterioration of the selective permeability of ions or deterioration of the selective permeability of ions or deterioration of the membrane strength is likely to be brought about. Note page 5 of the specification.

Accordingly, any possible *prima facie* case of obviousness engendered by the combined teachings of Terada et al and Tomoi et al stands rebutted by the superior results so shown, they constituting an unobvious result-effectiveness.

Withdrawal of the rejection of Claims 1-4, 11 and 12 under 35 U.S.C. § 103(a) as being unpatentable over Terada et al taken with Tomoi et al is requested.

Process Claims 5-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Terada et al taken with Tomoi et al, as applied to Claims 1-4, 11 and 12 above, further in view of MacDonald.

For reasons as pointed out and discussed above, the claimed process also is not taught by Terada et al nor obvious therefrom. Further, while MacDonald teaches a method of polymerizing a functional monomer together with a thermoplastic film forming polymer to prepare a membrane, no polymerizable monomer as required by the claims is disclosed by this reference. Here again, only a monomer of vinylbenzyltrialkylammonium chloride is, *inter alia*, disclosed as suitable. However, as pointed out and discussed above, a membrane resulting by the use of such polymerizable monomer results in a significantly and materially inferior product.

Further, as so stated by the Examiner, MacDonald is silent as to the irradiation step of Claim 10. Such procedure, however, additionally results in unobvious improvements, as note page 14, lines 9-18 of the specification. Manifestly, such additionally is not obvious.

Accordingly, withdrawal of the rejection of Claims 5-10 under 35 U.S.C. § 103(a) over the cited references is requested.

With regard to the rejection of Claims 1 and 2 under 35 U.S.C. § 101 as claiming the same invention as Claims 1 and 2 of co-pending application Serial No. 09/909,904, filed of even date, it is traversed.

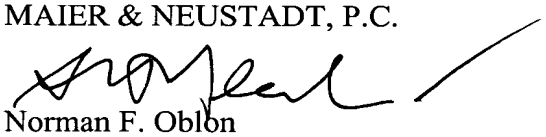
Requisite for such a rejection is that the claims in the co-pending application must be identical to those herein. Such clearly is not the case. The respective claims are different in scope with regard to the amounts of components, nature of components and structure. Note "mixed substantial uniformity" in the present claims, such limitation not being present in the claims of the co-pending application.

Accordingly, withdrawal of the rejection of the claims under 35 U.S.C. § 101 is requested.

It is submitted that this application is now in condition for allowance and which is solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Norman F. Oblon
Attorney of Record
Registration No. 24,618

Samuel H. Blech
Registration No. 32,082

22850

(703) 413-3000
Fax No.: (703)413-2220
NFO:SHB/cja

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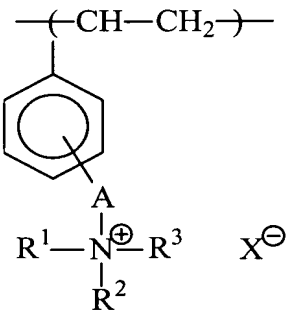
IN THE CLAIMS

--1. (Amended) An anion exchange membrane comprising a resin phase which contains from 20 to 96 mass% of a polymer having repeating units represented by the following formula (1):



. . . (1)

wherein A is a C_{3-8} alkylene group or an alkyleneoxyalkyl group having a total carbon number of from 4 to 9, each of R^1, R^2 and R^3 is a hydrogen atom, a C_{1-6} alkyl group or a hydroxyalkyl group, and X^- is an anion, and wherein any hydrogen atom bonded to the benzene ring may be substituted by an alkyl group or a halogen atom, and from 4 to 80 mass% of a thermoplastic polymer having no ion exchange groups, mixed substantially uniformly.--